Welcome to another edition of the Department of Materials Science and Engineering (MSE) newsletter. We are extremely pleased to have this opportunity to communicate with you regarding progress in our department in the last year, including several noteworthy items. The MSE department recently added a new Governor’s Chair position along with a related faculty in the area of radiation damage of materials. In addition, the department is poised to initiate a new collaboration with Oak Ridge National Laboratory (ORNL) and the State of Tennessee by establishing academic programs that would educate and train new scientists/engineers to meet future energy needs.

This past summer, the MSE department successfully hosted its first high school teachers Materials Summer Camp. A total of 25 teachers from Tennessee were exposed to the fundamentals and increasing importance of the materials in our society. The MSE department plans to host future camps for both high school students and teachers from a wider geographical area.

In this issue, we also highlight a number of faculty that have received international recognition, faculty and student awards, two new concentrations in the department and a new collaboration between our department and the Laboratory of Regenerative Medicine at the University of Tennessee Medical Center, Knoxville.

We hope you enjoy this issue of the MSE newsletter. If you have questions, don’t hesitate to contact us at mse@utk.edu.

Sincerely,

George Pharr
Department Head
MSE Faculty Adds Two New Concentrations, Program

In a recent meeting, the MSE faculty approved changes in the curriculum leading to the offering of two new concentrations at the graduate level: one in Biomaterials and another in Energy Science. In addition, the faculty approved a new five-year B.S./M.S. program. Qualified undergraduate students with a GPA of 3.4 or better will be allowed to take up to nine hours of graduate credit their senior year. This has always been possible under senior privilege, but the difference is these hours can count toward the requirements for both the B.S. and M.S. degrees, making it possible to complete a non-thesis M.S. degree with one additional year of coursework.

MSE Collaborates with the Laboratory of Regenerative Medicine

The Materials Science and Engineering Department has joined forces with the newly formed Laboratory of Regenerative Medicine (RegenMed) at the University of Tennessee Medical Center, Knoxville (UTMCK). RegenMed, formed in December 2009, is a highly multi-disciplinary (engineering, medicine, biology and chemistry) laboratory that develops unique and exciting solutions to difficult surgical problems with the desire to improve patient quality of life. RegenMed is an expansion of the Vascular Research Laboratory of the Department of Surgery at UTMCK.

Regenerative medicine is the science of accelerating the healing of damaged or diseased organs and tissue. This includes research in the field of tissue engineering, development of artificial organs, development of medical implants and stem cells.

Dr. Roberto Benson and his research group of five students – Tiffany Flick, Russell Hallman, Ryan Hammonds, Kaan Serpersu and Tommy Washington – are currently involved with the development of venous valve and tissue stimulants. The development of venous valves has the potential to help approximately 500,000 patients in the U.S. currently suffering from chronic venous insufficiency. Development of tissue stimulants will allow more accurate surgical models for surgeon training. The new approach involves the simulation of the tissue as individual nano- and micro-components instead of simply affecting the bulk properties of the tissue, since the bulk approach does not capture tissue details like the nanofibrous collagen and elastin layers in the subcutaneous tissue.

The relationship between RegenMed and Dr. Benson’s research group is long-term; however two of its short-term goals include providing fundamental materials characterization and fabrication expertise to the applied tissue engineering and vascular prosthetic research being conducted and to develop the required preliminary results to acquire large funding from National Institutes of Health or the American Heart Association.

“We hope to have National Institutes of Health funding within two years,” Dr. Benson said.

MSE Department Hosts Summer Teachers Camp

This past summer, the MSE department successfully hosted its first high school teachers Materials Summer Camp at Oak Ridge High School in Oak Ridge, Tenn. ASM International coordinates camps across the United States to introduce the field of Materials Science and Engineering to high school students and teachers. A total of 25 teachers from the surrounding area were exposed to the fundamentals and increasing importance of the materials in our society, including solids, metals, ceramics, polymers, composites and corrosion.

The camp instructors were Masters Teachers Debbie Goodwin and Brian Wright, assisted by Jim Endicott, a Master Teacher-in-Training, and Kurt Johanns, an MSE graduate student. Johanns was recognized by the Master Teachers, teachers attending the camp and co-organizers as an invaluable member of the team and part of the reason the camp was such a success.

“Helping with the Teachers Camp was an excellent experience that allowed me to interact with and learn from the people that
Dr. David Mandrus earned his Ph.D. in physics from Stony Brook University in 1992, following his dissertation research on infrared spectroscopy and break-junction tunneling studies of high-temperature superconductors. From 1992 to 1995, Dr. Mandrus was a postdoctoral associate at Los Alamos National Laboratory, and in 2000, he established the Correlated Electron Materials Group (CEMG) at ORNL. From 2000 to 2010, Dr. Mandrus served as a group leader of the CEMG, and in 2010, he joined the faculty here at the University of Tennessee.

He uses the experimental tools of materials synthesis and crystal growth to address cutting-edge issues in materials physics. Recent interests include the following: (1) discovery and characterization of new unconventional superconductors; (2) discovery and characterization of new collective phenomena in transition metal oxides, especially involving slow dynamics; (3) neutron-scattering investigations of exotic magnets; and (4) new materials for thermoelectric refrigeration and power generation.

Dr. Mandrus is a fellow of the American Physical Society and has authored or co-authored more than 250 technical papers that have been cited more than 6,000 times. His research areas include growth, discovery and materials physics of new electronic and magnetic materials (superconductors, thermoelectrics, multiferroics and itinerant magnets) as well as oxide electronics.

The MSE Honors Banquet Presents

Awards

The Department of Materials Science and Engineering Honors Banquet was held on April 6, 2010. The following awards were presented:

Graduate Student Award for Excellence in Teaching: Changli Wang

Graduate Student Award for Excellence in Research: Lujian Peng, Changli Wang, Sameer Paital and Li Li

Raymond A. Buchanan Award for Outstanding Junior: Katherine Strader

E. Eugene Stansbury Award for Outstanding Senior: William Brandon Goodwin and John Bohling

Outstanding Alumus Award: Dr. Elena Garlea

Outstanding Staff Award: Carla Lawrence

Faculty Award for Excellence in Teaching: Dr. Hahn Choo

Faculty Award for Excellence in Research: Dr. Yanfei Gao

Faculty Award for Excellence in Service: Dr. Kevin Kit

International Institute of Welding Recognizes Dr. Carl D. Lundin

Dr. Carl D. Lundin, a professor in the Department of Materials Science and Engineering, has been awarded the Evgeny Paton Prize by the International Institute of Welding. The Paton Prize is awarded to an individual who has made a significant contribution to science and technology through his or her lifetime dedication to "applied research and development in the field of advanced technologies, materials and equipment for welding and allied processes.”

The Evgeny Paton Prize consists of a medal and diploma given by the National Welding Committee of the Ukraine and the E.O. Paton Electric Welding Institute. The award also includes a visit by the winner to the E.O. Paton Electric Welding Institute in Kiev, Ukraine.

Three MSE Department Professors Win COE Awards

2010 Research Fellow Awards:

Dr. Yanfei Gao, Assistant Professor, Materials Science and Engineering

Dr. Bin Hu, Associate Professor, Materials Science and Engineering

Charles Edward Ferris Faculty Award:

Dr. Carl McHargue, Professor, Materials Science and Engineering, Director CMP

Dr. Takeshi Egami Recognized for Excellence in X-Ray Powder Diffraction

Dr. Takeshi Egami, a distinguished professor in the Department of Materials Science and Engineering and the Department of Physics and Astronomy, is the 2010 winner of the J.D. Hanawalt Award for excellence in the field of X-Ray powder diffraction. He received the award, along with co-recipient Simon Billinge of Columbia University, from the International Union of Crystallography for important contributions to the field of X-Ray powder diffractions. The award is given every three years.

Dr. Yanfei Gao

Dr. Bin Hu

Dr. Carl McHargue
directly influence children,” Johanns said. “I am amazed at how one small contribution can lead to big changes in a kid’s education. I am definitely looking forward to helping beyond my tenure here at UT.”

At the conclusion of camp, the teachers were challenged to go back and bring Materials Science and Engineering into their classrooms. The MSE department plans to host future camps for both high school students and teachers from a wider geographical area.